Towards an Artificial Intelligence Framework for Data-Driven Prediction of Coronavirus Clinical Severity

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Abstract

The virus SARS-CoV2, which causes coronavirus disease (COVID-19) has become a pandemic and has spread to every inhabited continent Given the increasing caseload, there is an urgent need to augment clinical skills in order to identify from among the many mild cases the few that will progress to critical illness We present a first step towards building an artificial intelligence (AI) framework, with predictive analytics (PA) capabilities applied to real patient data, to provide rapid clinical decision-making support COVID-19 has presented a pressing need as a) clinicians are still developing clinical acumen to this novel disease and b) resource limitations in a surging pandemic require difficult resource allocation decisions The objectives of this research are: (1) to algorithmically identify the combinations of clinical characteristics of COVID-19 that predict outcomes, and (2) to develop a tool with AI capabilities that will predict patients at risk for more severe illness on initial presentation The predictive models learn from historical data to help predict who will develop acute respiratory distress syndrome (ARDS), a severe outcome in COVID-19 Our results, based on data from two hospitals in Wenzhou, Zhejiang, China, identified features on initial presentation with COVID-19 that were most predictive of later development of ARDS A mildly elevated alanine aminotransferase (ALT) (a liver enzyme), the presence of myalgias (body aches), and an elevated hemoglobin (red blood cells), in this order, are the clinical features, on presentation, that are the most predictive The predictive models that learned from historical data of patients from these two hospitals achieved 70% to 80% accuracy in predicting severe cases